ORIGINAL RESEARCH

A comparative study of intrathecal bupivacaine 0.5% heavy with fentanyl versus intrathecal bupivacaine 0.5% heavy with buprenorphine in lower limb and lower abdominal surgeries

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ABSTRACT

Aims: The aim of the study is to compare the anaesthetic efficacy of intrathecal hyperbaric 0.5% Bupivacaine with 25mcg Fentanyl and intrathecal hyperbaric 0.5% Bupivacaine with 60mcg Buprenorphine for lower abdominal and lower limb surgeries

Materials and methods: The present study was undertaken in Sixty patients (of either sex belonging to ASA I and II physical status) posted for elective lower abdominal and lower limb surgeries (under Spinal Anesthesia) were selected and were randomly allocated into two groups; Buprenorphine (Group B), and Fentanyl (Group F).

Results: The demographic profile with regard to age ,gender, ASA grading, average duration of surgery were comparable in all the groups. The onset of block , mean time for onset of motor blockade,mean time for sensory regression, mean time for regression to bromage '1' , mean duration of analgesia was the difference between the groups was statistically significant.Intraoperative heart rates were comparable among the two groups ($p<0.005$). isolated incidents of Bradycardia were noticed – but were neither statistically significant nor clinically significant. There was gradual fall in the SBP and DBP towards 30 minutes into surgery followed by a stable state .Both the groups were comparable ($p>0.05$) with regard to their MAP, although hypotension was noticed in both the categories of patients.All the adverse events were mild in nature which required no intervention. No episodes of respiratory depression, dry mouth, PDPH were noted in any of the subject in both the groups.

Conclusions: Intrathecal Buprenorphine (60mcg) is superior over intrathecal Fentanyl (25mcg) as an adjuvant to Intrathecal hyperbaric 0.5% Bupivacaine when prolongation of spinal anaesthesia is desired.

Keywords: Intrathecal Buprenorphine, Hyperbaric 0.5% Bupivacaine, Spinal anaesthesia.

INTRODUCTION

Spinal anesthesia is a form of neuraxial regional anaesthesia involving the injection of local anaesthetic agent in the subarachnoid space.It is the most preferred regional anaesthesia technique. It is a safe,reliable, inexpensive ,simple to perform technique . It provides autonomic blockade with rapid and effective motor and sensory blockade .It is safe and effective for both elective and emergency surgeries involving lower abdomen , lower limbs.[1]

Various local anaesthetic agents are used for spinal anesthesia – Lignocaine and Bupivacaine being the most popular. Of the aforementioned two agents, hyperbaric Bupivacaine (administered intrathecally) provides intense sensory and motor blockade, therefore, it is the most widely used drug. Opioids are used as adjuvants to local anaesthetic agent to prolong the duration and quality of block, without any significant side effects.The principal advantage of intrathecal opioidsover systemic opioid techniques is that the former produces 'segmental analgesia' resulting in localized nociception without motor, sensory, autonomic, or systemic side-effects. [2]

Fentanyl is a phenylpiperidine-derivative, a lipid soluble synthetic opioid and a strong agonist at mu receptors. It is preferred for its rapid onset of action and shorter duration of action with lesser incidence of respiratory depression.Buprenorphine, is a thebaine derivative, which is a mixed agonist – antagonist with high affinity at both mu and kappa receptors. Abundant researchers [3] have studied the efficacy and safety of Fentanyl and Buprenorphine along with intrathecal local anaesthetics – and the evidence of their safety and efficacy, at different levels and strengths, is overwhelming. Moreover, there is fractured and unsettled evidence with regard to the optimal dosage of the drugs with respect to their safety and efficacy. So, we have undertaken a study to compare intrathecal Bupivacaine 0.5% heavy with Fentanyl versus intrathecal Bupivacaine 0.5% heavy with Buprenorphine in lower limb and lower abdominal surgeries.

MATERIALS AND METHODS

A prospective randomized study done in Patients posted for elective surgeries below umbilical level in Mediciti Institute of Medical sciences from Jan 2019– Sep 2020. Random sampling is done to take 60 patients

INCLUSION CRITERIA

ASA physical status 1 and 2, age range of 18-65 years, either sex posted for elective lower limb and lower abdominal surgeries

EXCLUSION CRITERIA

Patients with allergy to local anaesthetic agents and opioids 3. Patients with any bleeding diathesis and coagulopathy and Patients with contraindications for neuraxial anaesthesia.

After obtaining the written informed consent, study population was randomly divided into two groups with 30 patients in each group.

1. Group F received 0.5ml (25mcg) of Fentanyl with 3ml (15mg) of 0.5% hyperbaric bupivacaine intrathecally
2. Group B received 0.2ml (60mcg) of Buprenorphine with 3ml (15mg) of 0.5% hyperbaric bupivacaine intrathecally.

Quality of motor blockade in the lower limb was assessed using Modified Bromage scale

0 - No motor blockade, able to lift the leg at hip

1- Inability to raise extended leg: able to move knees and feet

2- Inability to raise extended leg and move knee; able to move feet

3- Complete block of motor limb

Onset of motor blockade was defined as the time taken from intrathecal drug injection until bromage 3 score observed.

Duration of motor blockade was defined time taken from onset of motor blockade till the patient attained complete motor recovery (bromage 0). Sensory and Motor blockade was assessed until complete recovery of motor function and sensory regression at S1. It is the time taken from onset of sensory blockade to the time when patient requires first dose of analgesia for post operative pain. Pain was assessed using 'visual analogue scale'. It is

linear scale consists of 10cm line anchored at one end. Patient marks the line to indicate the severity of pain. 0-no pain, 10-severe pain. Rescue analgesia was given for VAS >6. Time of supplementation was noted.

Vitals (HR,SBP,DBP,MAP,RR,SPO_2) were recorded before the procedure and immediately after the subarachnoid block, then at 2min interval for 10min,later at 10min interval for next 50min and then after every 15min till completion of procedure.Duration of surgery in each case was also noted. Patient was monitored thereafter till 24hrs in postoperative ward.

Any side effects such as hypotension, bradycardia, pruritus, nausea vomiting, shivering, respiratory depression were checked and recorded.Nausea, vomiting if any was treated with In Ondansetron 4mg IV, shivering was treated with Tramadol25mgIV; Pruritus was treated with In Chlorpheniramine maleate 25mgIV.

STATISTICAL ANALYSIS

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented as Mean + (Min-Max) SD and results on categorical measurements are presented in Number (%).

Chi-square / Fisher Exact test was used to find the significance of study parameters on Continuous scale within group (intra group analysis) on metric parameters. Student's T Test (two tailed, independent samples) was used to find the significance of study Parameters. Significance is assessed at 5% level of significance. P value of <0.05 was considered significant.

As planned and documented in the methodology section of this study, we collected the data, entered the same into excel sheet and conducted statistical analysis by using SPSS software (ver:23).

RESULTS

Table-1: Demographic data in present study

Demographic Data	F Group (n=30)	B Group (n=30)	t	p
Age in years(Mean+SD)	44.9+14.3	45.2+10.99	0.4982	0.3101
ASA grading				
ASA 1	20	20	0	1
ASA 2	10	10		
Gender				
Male	25	23	0.4167	0.5186
Female	05	07		
Duration of Surgery	103.9+20.95	106.5+11.12	-0.608	0.2727

The two groups were comparable with regard to age, gender, and ASA physical status.

Table-2: Pre-Anesthesia Vital Parameters

Preoperative Vitals	F Group (n=30)		B Group (n=30)		t	p
	Mean	SD	Mean	SD		
PR (Per Min)	81.63	4.87	80.73	9.84	0.098	0.46
SBP (mmHg)	122.87	9.62	127.40	11.19	0.142	0.44
DBP (mmHg)	78.13	6.85	76.67	8.44	0.743	0.23
MAP (mmHg)	91.17	5.12	89.67	5.62	0.685	0.37
RR (Per Min)	14.33	1.56	13.77	1.59	0.337	0.39
SPO_2	98.77	0.43	98.67	0.48	0.648	0.26

All vital parameters are insignificant in both groups

Table-3: Sensory and motor variables in present study

	F Group (n=30)		B Group (n=30)		t	p
	Mean	SD	Mean	SD		
Onset of Sensory Block	3.73	0.78	3.37	0.61	2.0141	0.0243
Motor Blockade Onset	5.6	0.101	5.3	0.093	16.267	0.001
Sensory Regression (to S1)	171.47	4.14	271.93	15.87	-33.56	<0.00001
motor regression to bromage '0'	204.50	6.26	303.83	17.4	-29.4	<0.00001
Duration of Analgesia (in Minutes)	253.67	5.18	329.63	20.16	-19.99	<0.0001

The mean time for the onset of sensory blockade is statistically significant. The onset of block is faster in the B Group

The mean time for onset of motor blockade is statistically significant. Addition of Buprenorphine to Bupivacaine produces an earlier motor blockade onset when compared to Fentanyl .

The mean time for sensory regression is statistically very much significant. Addition of Buprenorphine to Bupivacaine prolongs the sensory blockade when compared to Fentanyl.

The mean time for motor regression to bromage '0' statistically very significant with a P value <0.00001.Addition of Buprenorphine prolongs the duration of motor blockade when compared to Fentanyl. The mean duration of analgesia in the Fentanyl group was statistically significant difference between the performance of both the drugs .The addition of Buprenorphine as anadjuvant to Bupivacaine provides longer duration of post operative analgesia when compared to Fentanyl.

Table-4: Post-Block vitals in present study (beats per minute)

Heart rate (beats per minute)	F Group (n=30)		B Group (n=30)		t-test	p
	Mean	SD	Mean	SD		
Pre op	80.60	11.80	81.60	11.65	-0.031	0.974
2 min	82.10	11.64	82.33	12.43	-0.827	0.414
4 min	82.00	13.06	81.40	11.95	-0.1	0.92
6 min	79.67	12.13	80.00	10.99	-0.4	.691
8 min	79.53	12.54	78.87	10.93	-0.67	0.507
10 min	77.83	11.87	78.17	10.31	-0.428	0.671
20 min	76.67	10.67	77.60	10.45	0.06	0.95
30 min	75.30	11.10	76.37	9.80	-0.211	0.834
40 min	74.87	10.30	75.67	9.70	-1.107	0.277
50 min	74.80	10.05	75.33	9.52	-0.746	.461
60 min	74.60	9.94	74.33	9.08	-1.024	0.314
75 min	77.67	12.31	74.30	8.64	-0.49	0.62
90 min	74.53	9.31	74.30	8.22	-0.43	0.667
105 min	78.50	11.10	75.13	10.24	-0.347	0.845
120 min	77.33	10.79	74.87	10.16	-0.583	0.745
systolic blood pressure						
Pre op	122.53	9.75	127.87	10.58	-0.067	0.947
2 min	120.13	11.45	125.20	12.10	-0.101	0.92
4 min	117.37	11.85	121.63	12.81	0.49	0.627
6 min	115.00	11.14	120.20	11.12	0.943	0.353
8 min	112.70	10.84	117.40	9.90	0.980	0.335

10 min	111.20	10.11	115.37	9.32	0.784	0.439
20 min	110.90	9.37	114.70	9.09	0.974	0.337
30 min	111.17	9.15	115.23	9.21	0.296	0.769
40 min	110.60	9.13	114.60	7.92	1.303	0.202
50 min	111.70	8.84	113.67	7.70	0.062	0.952
60 min	111.60	8.72	113.60	7.92	0.274	0.785
75 min	111.93	8.64	114.43	8.11	0.628	0.534
90 min	113.00	8.52	115.47	7.86	0.714	0.48
105 min	113.70	8.47	115.40	8.03	0.711	0.53
120 min	114.83	8.53	116.23	9.53	0.675	0.67
Diastolic Blood Pressure						
Pre op	81.92	9.18	78.52	9.626	1.807	0.074
2 min	77.38	9.68	71.26	8.361	3.382	0.001
4 min	72.46	8.57	70.02	9.505	1.348	0.181
6 min	69.04	8.652	68	11.03	0.525	0.601
8 min	65.76	7.875	70.16	8.897	-2.618	0.01
10 min	62.3	8.399	66.68	10.314	-2.328	0.022
20 min	60.92	9.236	65.12	9.967	-2.186	0.031
30 min	61.36	7.403	64.8	9.664	-1.998	0.049
40 min	60.9	8.252	64.94	9.627	-2.253	0.026
50 min	61.28	8.502	64.76	9.82	-1.954	0.053
60 min	62.98	8.97	65.16	8.906	-1.232	0.221
75 min	66.06	7.47	65.62	8.308	-0.274	0.785
90 min	69	7.54	67.18	8.42	1.138	0.258
105 min	66.05	7.46	65.62	8.38	-0.2	0.7
120 min	66	7.40	65.6	8.3	-0.27	0.7

Intraoperative heart rates, Systolic blood pressure and diastolic blood pressure O 2 saturation has no statistical significance among the groups.

Table-5: Postoperative side effects were comparable among the groups

Adverse Event	Number of Patients	
	F Group (n=30)	B Group (n=30)
Nausea	2	2
Vomiting	1	1
Pruritis	2	1
Bradycardia	1	1
Hypotension	7	7

2 (two) patients in each group experienced Nausea; 1 (one) in each group experienced vomiting; 1 (one) in each group had bradycardia; 7 (seven) in each group experienced hypotension and; 2 (two) in Group F and 1 (one) in Group B experienced pruritis. All the adverse events were mild in nature which required no intervention.

DISCUSSION

Spinal anaesthesia is easy to perform, produces rapid onset of anaesthesia and complete muscle relaxation and is also economical. Therefore, it is the most preferred regional

anaesthesia technique. However, its duration of action is comparatively short. Pain is almost always a postoperative experience, however, inadequate management of the pain is also something which is very commonly experienced by patients.

There is an overwhelming empirical evidence of different levels and strengths (case reports, case series studies, controlled clinical trials, randomized controlled trials, and systematic reviews & meta-analysis) that both Fentanyl and Buprenorphine are good adjuvants to Bupivacaine for intrathecal administration in terms of safety and efficacy. Several studies conducted through different methodologies in different situations, in different populations and in different settings prove the same, with varying strength and level of evidence.

In our study Age was comparable [The mean age was 44.90±14.36 for the Fentanyl (F) group and 45.20±10.99 for the Buprenorphine (B) group (p=0.3101)]. The demographics of the patients in other studies were similar to that of our study. Almost all the studies[5]had comparable Groups with regard to Age. Although the subjects were of not the same age group, there was no statistically significant difference within and between the age groups under study.

The study comprised of equal number of subjects in both Fentanyl and the Buprenorphine group in terms of American Society of Anaesthesiologists (ASA) grading (p=1). While some studies made no mention of ASA grading, there was no statistically significant difference between the groups in some studies[5] which reported this parameter (p>0.05).

In our study, distribution of gender in both the groups was also comparable (p=0.518). The gender distribution was comparable in all the studies that have made a mention of the gender distribution.[5]

The average duration of surgery for the Group F was 103.93±20.95 minutes, and that of the Group B was 106.57±11.12 minutes. Both the aforementioned Groups were comparable (p=0.2727). No statistically significant difference was observed between the groups in similar kind of studies.[6]

In our study, all the pre-operative vital parameters were comparable with no significance in both groups which is comparable to Singh AP et al[7], Bhukya N et al[8], and Sonya K et al.[9] (2017) compared the effectiveness of Fentanyl and Buprenorphine in the recent past. These studies reported that the pre-operative vital parameters were comparable in the study groups.

The studies[10], which compared Fentanyl with other adjuvants (other than Buprenorphine), and the studies[11] which compared Buprenorphine with other than Fentanyl too reported that the pre-operative vital parameters were comparable in the study groups.

In our study, the onset of sensory block in the F Group was 3.73±0.78 minutes, and that of the B Group was 3.37±0.61 minutes. The onset of block was quicker in the B Group, and the difference between the groups was statistically significant (p=0.0243).

We observed that the mean time for sensory regression (to S1) was 171.47±4.14 minutes in the F Group, and was much higher (271.93±15.87 minutes) 54in the B Group. The difference was statistically very much significant (p<0.00001). .Addition of Buprenorphine to Bupivacaine prolongs the sensory blockade when compared to Fentanyl

With regard to motor blockade, the onset of motor block in the F Group was 5.6±1.05 minutes, however, it was significantly less in the B Group 5.3 ±0.59 min (P- 0.001). Addition of Buprenorphine to Bupivacaine produces an earlier motor blockade onset when compared to Fentanyl. The mean time for regression to bromage ‘0’ was 204.50±6.26 minutes in the F Group, and 303.83±17.40 minutes in the B Group. The difference between the two groups was statistically very significant (p<0.00001). Addition of Buprenorphine prolongs the duration of motor blockade when compared to Fentanyl

Bhukya et al[8] compared the efficacy of intrathecal Fentanyl or Buprenorphine with bupivacaine for all infraumbilical (lower abdominal & lower limb) surgeries, and observed regression of motor block to Bromage0. The time to regression was significantly prolonged

to 205±37.71 in the Buprenorphine group, while it was 152.90±8.31 in the Fentanyl group. The anaesthesiologists noticed prolonged duration of sensory and motor blockade in Buprenorphine group compared to Fentanyl group. The findings of this study were in agreement with our study.

Similar to our study, Sonya K et al[9] evaluated the duration of analgesia, sensory and motor blocking properties and side effects of two opioids – Fentanyl and Buprenorphine, when used as adjuvant to spinal Bupivacaine in caesarean section – and observed that maximum height of sensory block was achieved faster in Fentanyl group (4.09±1.12 minutes in Fentanyl group and 4.56±1.21 minutes in Buprenorphine group).

Khan FA et al[12] compared the characteristics of spinal block, its postoperative analgesic effects and side effects using intrathecal bupivacaine and its combination with Fentanyl or Buprenorphine in elderly patients undergoing Transurethral Resection of Prostate (TURP) surgery. In this study, 60 patients aged 60 and above received hyperbaric bupivacaine 0.75% 2mL (Group L control, n=20), Buprenorphine 30mcg with hyperbaric bupivacaine 0.75% 2mL (Group B, n=20) or Fentanyl 10mcg with hyperbaric bupivacaine 0.75% 2mL (Group F, n=20), and observed that the mean time for the sensory block to reach T10 dermatomal level was 3.2±2 minutes in Group F vs. 4.3 ± 1 minutes in group B and 4.5 ± 2 in the control Group. The duration of sensory block was significantly longer in group B. Median block levels reached T8 in all groups.

Singh AP et al[7] observed that the time to onset of sensory and motor block in all the three groups (of their study) was comparable. However, duration of sensory block was significantly prolonged in Groups II (Buprenorphine) and III (Fentanyl) in comparison to Group I (Control) ($P < 0.05$) and it was the longest in Group II ($P < 0.05$). The duration of motor blockade was similar in all the three groups. Intra-Operative and Post-Operative Hemodynamics , Intraoperatively, hemodynamics' (HR – SBP – DBP – MAP – RR – SPO_2) assessment was done at 2 minutes, 4 minutes, 6 minutes, 8 minutes, 10 minutes, 20 minutes, 30 minutes, 40 minutes, 50 minutes, 60 minutes, 75 minutes, 90 minutes, 105 minutes and 120 minutes.

Intraoperative heart rates were comparable among the two groups ($p>0.05$). There was an initial decrease in both the categories followed by a stable heart rate through the intraoperative phase. There was no evidence of either Bradycardia or Tachycardia, although isolated incidents of Bradycardia were noticed – but were neither statistically significant nor clinically significant.

We noticed initial small and slow dip until 30 minutes intraoperatively in the systolic blood pressure, diastolic blood pressure followed by a slow rise to reach a stable state by the end of the surgery, in both the categories. Although hypotension was noticed, in both the categories of patients, it was neither statistically significant nor clinically significant. Hypotension was settled without any intervention.

The difference in Mean arterial pressure between the groups was not statistically ($P>0.05$) and clinically significant till 10min after spinal injection. In the 10th min and 20th min P value was 0.014 and 0.03 respectively .Even though it was statistically significant, the mean MAP lies in normal range which is clinically not significant. After 20min, the MAP in both these groups remains both statistically and clinically not significant. Hence both Fentanyl and Buprenorphine produces similar changes in Map when added as adjunct to hyperbaric Bupivacaine

We found no instance of Bradypnea or Tachypnea throughout the study in any of the subject of any Group. Both the groups had comparable oxygen saturation (SPO_2) levels throughout the surgery, with no statistically significant difference among the groups.

In Bhukya et al study[8], the mean fall in BP was comparable in all groups and hypotension if present was transient. The blood pressure and heart rate were acceptable in all groups. The

authors of the study observed bradycardia in Group B in 7 patients (14%), hypotension in 14 patients (28%), and in Group F, 7 patients developed hypotension. This was similar in earlier studies. In the same study, none of the patients in the study groups had respiratory depression. Arterial oxygen saturation in all the cases remained above 96% and mean respiratory rate of the patients were above. None of the patients required any respiratory support.

In Khan FA et al[12] study, patient's blood pressure remained within 20% of baseline values. The authors of a studyconcluded that addition of Buprenorphine and Fentanyl as adjuvants to intrathecal 0.75% ropivacaine prolongs postoperative pain relief without causing any increase in the duration of motor blockade but Buprenorphine is better as compared to Fentanyl in prolonging the duration of sensory block and achieving a better outcome in terms of pain relief.

In our study, the mean duration of analgesia in the Fentanyl group was found to be 253.67±5.18 minutes while those in the Buprenorphine group found to be only 329.63±20.16 – a statistically significant difference between the performance of both the drugs ($p<0.0001$). The addition of Buprenorphine as an adjuvant to Bupivacaine provides longer duration of post operative analgesia when compared to Fentanyl. In Khan FA et al[12] study, all patients required postoperative analgesia in group L and F except 6 in Group B. Buprenorphine 30mcg in combination with bupivacaine 0.75% 2 mL provided analgesia of comparable clinical onset and longer duration, but was associated with a clinically increased incidence of nausea and vomiting in elderly patients.

Singh AP et al[7] concluded that addition of Buprenorphine and Fentanyl as adjuvants to intrathecal 0.75% ropivacaine prolongs postoperative pain relief but Buprenorphine is better as compared to Fentanyl achieving a better outcome in terms of pain relief.

Bhukya et al[8] demonstrated that even low dose (60mcg) of Buprenorphine could give good postoperative analgesia with minimal, easily manageable side effects. The intrathecal route has advantages of greater technical ease and a single injection producing pain relief of sufficient duration is always beneficial. In this study, VAS scores were significantly low for the Buprenorphine group when compared with Fentanyl group. In the same study[55], the onset of analgesia for the study group varied from 2–5 mins., mean 2.3 mins., on the other hand, onset of analgesia in the control group varied from 4–10 mins. with mean of 5.36 mins. The results of this studyshow that there is statistically highly significant difference in the onset of analgesia and that the addition of Buprenorphine hastens the onset of action ofbupivacaine. Furthermore, the duration of analgesia with 60 mcg Buprenorphine along with 10 mg bupivacaine was 6 – 10 hours with mean of 7.8 hours in contrast to control group, which had a duration of analgesia 2 – 4 hours with mean of 2.38 hours. The duration of analgesia in the study group was significantly prolonged when compared to control group. Supplemental analgesia was given for visual analogue score of more than 6. Time of supplemental analgesia was noted.

Sonya K et al[9] concluded that although Fentanyl produces faster sensory block, duration of analgesia is longer with Buprenorphine, and both the drugs do not cause significant side effects.

Dixit S[13] compared intrathecal bupivacaine 0.5% and Buprenorphine 60µg with bupivacaine 0.5% for postoperative analgesia in caesarean section (Control group (C) received 1.70 mL (8.5mg) of bupivacaine (0.5%), while patients of study group (S) received 1.70mL (8.5mg) of bupivacaine (0.5%) +60µg Buprenorphine), and concluded that combination of Buprenorphine 60µg with (0.5%) bupivacaine (8.5mg) provided analgesia of clinical onset and longer duration of postoperative analgesia after caesarean section with no effects on neonatal Apgar scores with minimal side effects.

Thomas W et al[11] assessed the efficacy of intrathecal Buprenorphine for postoperative relief and to study the incidence of side effects (First group received 15 mg bupivacaine 0.5% with 1mcg/kg Buprenorphine intrathecally upto a maximum of 50mcg and served as the study group. Control group received 15mg of plain 0.5% bupivacaine), and concluded that the side effects were minimal and the intensity of analgesia in the study group was 15.28 hours (mean) compared to 3.8hours (mean) in control group.

Capogna et al[14] assessed the degree of analgesia of two doses of intrathecal Buprenorphine using visual analogue scale, and found that 45 mcg intrathecal Buprenorphine has better quality and duration of analgesia than 30 mcg.

Intrathecal Buprenorphine improves mobility, thereby reducing chances of thromboembolic phenomenon. Intraoperatively, quality of analgesia was excellent in study group, visceral or traction pain, and pain during exteriorization of uterus was obtunded due to favourable property of intrathecal opiates. Shah et al[15] observed the same.

Thomas et al[11] assessed the efficacy of Buprenorphine as postoperative analgesic using the Magill's classification. High affinity of Buprenorphine for narcotic receptors produces longer duration of action. As Buprenorphine is a lipid soluble drug and rapid absorption into the spinal venous plexus occurs, there is minimal increase in spinal fluid concentration, thus minimal risk of respiratory depression is associated with rostral spread.

In the present study, the postoperative side effects were comparable among the groups. 2 (two) patients in each group experienced Nausea; 1 (one) in eachgroup experienced vomiting; 1 (one) in each group had bradycardia; 7 (seven) in each group experienced hypotension and; 2 (two) in Group F and 1 (one) in Group B experienced pruritis. All the adverse events were mild in nature which required no intervention. No episodes of respiratory depression, dry mouth, or PDPH were noted in any of the subject in both the groups.

Bhukya et al[8] reported that the incidence of nausea and vomiting was 20% in Group B, which was slightly higher than the other group. Previous studies show the incidence of pruritus after epidural administration of 50 mcg Fentanyl was 47% and with 300mcg Buprenorphine was 10%. Incidence of PDPH, backache and drowsiness were not reported. The high rate of nausea and vomiting in those patients warrants the use of ondansetron as premedication and for at least 24 hours postoperatively till the effect of opioids wear off.

In the same study[16] Neonatal outcome was good in all the groups assessed by 1 minute and 5 minutes Apgar and due to unavailability umbilical arterial blood pH was not done. So, Buprenorphine (60mcg), when used an adjuvant to bupivacaine, prolongs the duration of sensory and motor block, increases the duration of analgesia (resulting in less requirement of post-operative analgesia), with minimal side effects when compared to Fentanyl (25mcg) as an adjuvant.

LIMITATIONS

1. All type of surgeries were not included this study.
2. The sample size of study Groups was very limited, so cannot generalize this study results to the entire population.
3. We did not use placebo group, which could have given a more accurate picture of effectiveness and efficacy of Buprenorphine.
4. We used fixed dosage (60mcg in Buprenorphine and 30mcg in Fentanyl Groups) in both the groups, so the results of this study cannot be generalizable for all clinical conditions and, for all kinds of age groups.

This study was conducted in a very specific setting, so, the findings of this study cannot be generalizable to other clinical settings.

CONCLUSIONS

Conclusions with regard to our study include the Buprenorphine (60mcg), when used as an adjuvant to Intrathecal hyperbaric bupivacaine produces early onset of sensory and motor blockade .The duration of both sensory and motor blockade was also significantly prolonged with Buprenorphine. Buprenorphine provides relatively hemodynamically stable conditions. The duration of postoperative analgesia is also significantly longer with Buprenorphine. Intraoperatively, there were fewer incidences of side effects with intrathecal Buprenorphine .In conclusion Intrathecal Buprenorphine (60mcg) is superior over intrathecal Fentanyl (25mcg) as an adjuvant to Intrathecal hyperbaric 0.5% Bupivacaine when prolongation of spinal anaesthesia is desired.

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